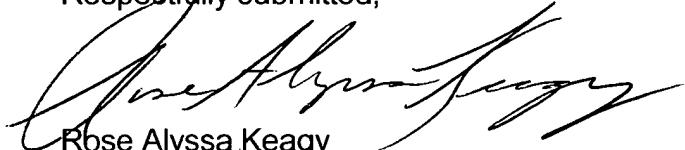


REMARKS

This application is in condition for allowance except for the correction of formal matters. The Applicants submit a new set of formal drawings in response to the Examiner's request to move Tables 1-3 from the Specification to drawing FIGS. 4-6. In addition, the Applicants amend the Specification hereinabove to conform the language of the Specification to these drawing changes. The Applicants respectfully request the entry of the amendments indicated hereinabove.

Respectfully submitted,



Rose Alyssa Keagy
Attorney for Applicants
Reg. No. 35,095

Texas Instruments Incorporated
PO BOX 655474, M/S 3999
Dallas, TX 75265
972/917-4167
FAX - 972/917-4409/4418

0.5 wt% H₂O₂ solution) for 10 min. Then, final rinsing was performed for 10 min using the conventional method and the method of the present invention, and the residual minute particles were counted. The final rinsing process was performed as follows.

Comparative Example 1: Cleaning was performed with ultra-pure water without using ultrasonic waves.

Comparative Example 2: Cleaning was performed with ultrasonic waves, and with ultrasonic waves irradiated from the beginning.

Comparative Example 3: Cleaning was performed with hydrogen water (without adding NH₄OH (ammonium hydroxide)), and with ultrasonic waves irradiated from the beginning.

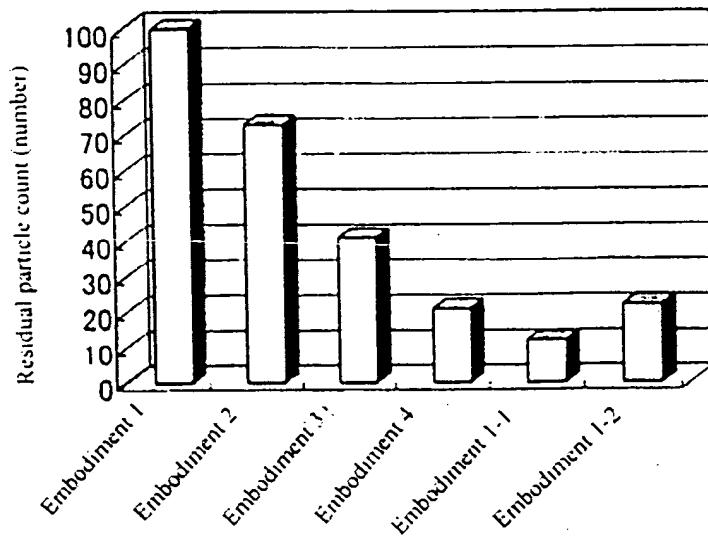
Comparative Example 4: Cleaning was performed with hydrogen water (added with NH₄OH), and with ultrasonic waves irradiated from the beginning.

Embodiment 1-1: Cleaning was performed with hydrogen water (without adding NH₄OH), and with ultrasonic waves irradiated for a prescribed time of 120 sec according to the present invention.

Embodiment 1-2: Cleaning was performed with hydrogen water (added with NH₄OH), and with ultrasonic waves irradiated for a prescribed time of 120 sec according to the present invention.

In each final rinsing step, the cleaning solution was fed at a rate of 15.0 L/min into a 18.24-L cleaning solution tank. Output of the ultrasonic waves was 1.0 MHz and 4.1 W/cm². Also, measurement of the residual particles was performed for particles of 0.2 µm or larger using a laser scattering type particle counter. The results are shown in the following graph.

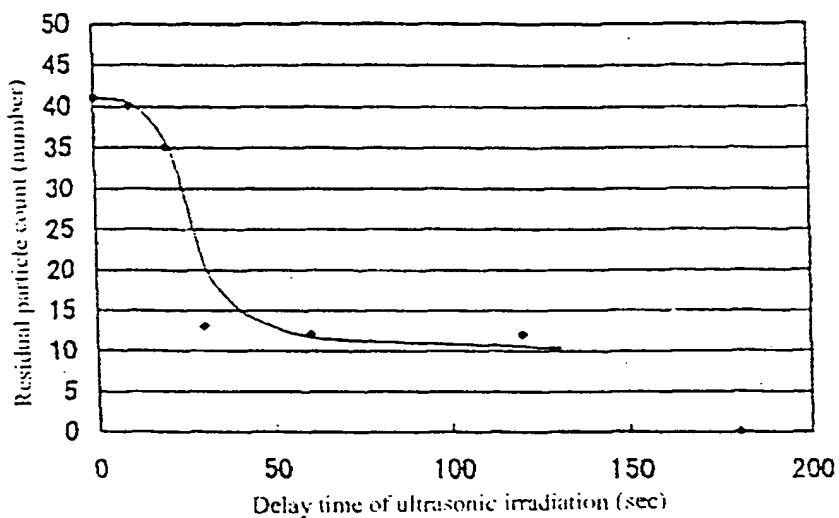
FIG. 4
Table 1



As can be seen from the aforementioned results, when ultrasonic irradiation is performed after a prescribed delay time in the final rinsing process, the removal rate of minute particles adhered to the surface of the semiconductor wafers can be increased significantly.

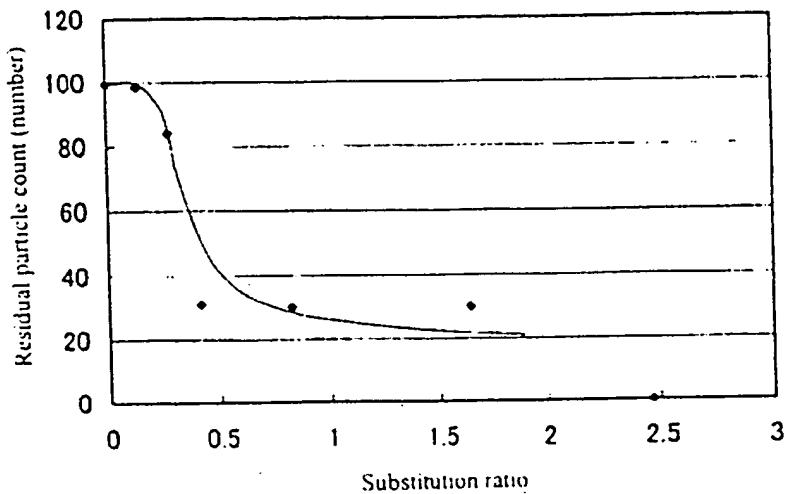
Then, under the same experimental conditions (Embodiment 1-1), the prescribed delay time to initiate ultrasonic irradiation was changed in the range of 0-180 sec to determine the influence of the prescribed time on the removal rate of the minute particles. The results are shown in the following graph.

FIG. 5
Table 2



Also, the value of the above graph was plotted versus the substitution ratio of the cleaning solution with respect to the cleaning solution tank as follows. In this case, the results of the above graph are converted to relative values, with unity defined as the case when the same amount of cleaning solution is fed per unit time (min) into a cleaning solution tank of unit volume (L).

FIG. 6
Table 3



As can be seen from the aforementioned results, in order to remove minute particles effectively, it is preferred that the prescribed time be 20-30 sec or longer, and the substitution ratio of the cleaning solution with respect to the cleaning solution tank be 0.4 or higher. Also, the values for the residual particle count listed in Tables 1-3 refer to the results measured with respect to 6-inch semiconductor wafers.

An embodiment of the present invention was explained above with reference to figures. However, the present invention is not limited to the aforementioned embodiment. It is possible to make changes and modifications as long as the claims of the patent application are observed.